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An Assessment of Brain Function Predicts Functional Gains in a Clinical Stroke Trial

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INTRODUCTION: A number of therapies are in development to restore brain function after injury. Injuries and their effects vary widely, emphasizing the need to define which patients will respond to such interventions. The current study hypothesized that a baseline measure of brain function would have independent value for predicting subsequent therapeutic gains. METHODS: In a clinical trial evaluating 6 weeks of rehabilitation therapy, with or without investigational motor cortex stimulation, 24 patients with chronic stroke underwent baseline clinical assessment and functional MRI (fMRI), 6 weeks therapy, then repeat of clinical and fMRI assessments. The primary clinical outcome measure was arm motor Fugl-Meyer (FM) score. RESULTS: Across all patients, bivariate analysis found that gains in FM score over the period of treatment were predicted by three measures : baseline FM score, infarct volume, and baseline degree of motor cortex activation during hand movement at fMRI. Multivariate regression across all patients found that lower baseline motor cortex activation and higher FM score were independent predictors of greater FM score gains. CONCLUSIONS: The effects of therapies acting on the brain can be predicted in part by measuring baseline brain function. These findings will be informative for clinical decision-making.